National Institute of Environmental Health Sciences

# Harmful algae and their potential impacts on desalination operations off southern California

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**Year:** 2010
**Journal:** Water Research. 44 (2): 385-416

**Abstract:**

Seawater desalination by reverse osmosis (RO) is a reliable method for augmenting drinking water supplies. In recent years, the number and size of these water projects have increased dramatically. As freshwater resources become limited due to global climate change, rising demand, and exhausted local water supplies, seawater desalination will play an important role in the world's future water supply, reaching far beyond its deep roots in the Middle East. Emerging contaminants have been widely discussed with respect to wastewater and freshwater sources, but also must be considered for seawater desalination facilities to ensure the long-term safety and suitability of this emerging water supply. Harmful algal blooms, frequently referred to as 'red tides' due to their vibrant colors, are a concern for desalination plants due to the high biomass of microalgae present in ocean waters during these events, and a variety of substances that some of these algae produce. These compounds range from noxious substances to powerful neurotoxins that constitute significant public health risks if they are not effectively and completely removed by the RO membranes. Algal blooms can cause significant operational issues that result in increased chemical consumption, increased membrane fouling rates, and in extreme cases, a plant to be taken off-line. Early algal bloom detection by desalination facilities is essential so that operational adjustments can be made to ensure that production capacity remains unaffected. This review identifies the toxic substances, their known producers, and our present state of knowledge regarding the causes of toxic episodes, with a special focus on the Southern California Bight.

**Source:** http://dx.doi.org/10.1016/j.watres.2009.06.051

## Resource Description

**Communication:**

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

**Communication Audience:**

audience to whom the resource is directed

Policymaker

**Early Warning System:** ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

**Exposure :** ☑

weather or climate related pathway by which climate change affects health

Food/Water Quality

**Food/Water Quality:** Biotoxin/Algal Bloom

**Geographic Feature:** ☑

resource focuses on specific type of geography

Ocean/Coastal

**Geographic Location:** ☑

resource focuses on specific location

United States

**Health Impact:** ☑

specification of health effect or disease related to climate change exposure

Other Health Impact

**Other Health Impact:** Algal bloom toxicity

**Intervention:** ☑

strategy to prepare for or reduce the impact of climate change on health

A focus of content

**Mitigation/Adaptation:** ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

**Resource Type:** ☑

format or standard characteristic of resource

Research Article

**Timescale:** ☑

time period studied

Time Scale Unspecified

**Vulnerability/Impact Assessment:** ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content